**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6.1 Notes**

**Directions: Define the following terms using the book. Also, complete the problems using the book.**

Experiment vs. Observational Study (again):

Explanatory Variable-

Response Variable-

Individuals = the things that the experiment or study is being done on (ex: cars, plants, etc.)

Subjects= ***humans*** who are in the experiment or study.

Treatment-

**Example 1:** A scientist wants to see if a new fertilizer will help the growth of rose bushes. He wants to compare this to the current fertilizer as well as no fertilizer at all. He has 20 rose bush plants to use. Identify the following:

Subjects/Individuals: ***20 rose bushes (individuals)***

Treatments: ***new and old fertilizer, and no fertilizer.***

Explanatory Variable: ***fertilizer***

Response Variable: ***growth of the rose bushes***

Experiment or Obs. Study: ***Experiment***

**Example 2:** I want to test out a new plant food. So I take 20 plants, and give half the new plant food and half no food at all. All of the plants get the same amount of water and sunlight each day. After 30 days, I measure the height that the plant has grown, and also how many flowers it has on it.

Subjects/Individuals: ***20 plants (Individuals)***

Treatments (there are two):

Explanatory Variable: ***Plant food***

Response Variable:

Experiment or Obs. Study:

**Example 3:** I want to look at the effect of AP classes on college acceptances. I get a list of all students in a high school, as well as the number of AP classes each student took over their 4 years of HS. I then obtain the % of colleges they were accepted into. I compare the % acceptance for the students who did not take AP classes to those that did.

Subjects/Individuals:

Treatments (are there any?):

Explanatory Variable:

Response Variable:

Experiment or Obs. Study: ***observational study***

-----------------------------------------------------------------------------------------------------------------------------------------

**Designing studies- what can go wrong:**

Lurking variables (again)-

Confounded variables (again)-

**More vocab…**

Clinical trials-

Placebo-

*Example:*

Placebo Effect -

*Example:*

**DESIGNING EXPERIMENTS!**

Let’s go back to the plant food example from before. How could we draw the design of this experiment?

**RANDOMIZED COMPARATIVE EXPERIMENT (aka Completely Randomized Design)**

**Design:**

**Example:**

**Control Group-**

**Example 1:**

High cholesterol level in people can be reduced by exercise or by drug treatment. A pharmaceutical company developed a new cholesterol-reducing drug. Researchers would like to compare the effects of the new drug with the currently used and accepted drug. 100 Volunteers who have a history of high cholesterol and who are currently not on any medication will be recruited to participate.

What are the treatments?

What are the subjects/individuals?

What is the response variable?

Would a control/placebo group be appropriate/necessary?

Design the experiment below:

**Example 2:**

A biologist is interested in studying the effects of both growth-enhancing nutrients and different salt levels on the growth of shrimps. The biologist is planning on using 3 different growth-enhancing nutrients (A, B, C) combined with 2 different salt levels (high and low). There are 12 tanks of shrimp available to give the treatments to.

What are the treatments?

What are the subjects/individuals?

What is the response variable?

Would a control/placebo group be appropriate/necessary?

Design the experiment below:

**Example 3:**

As dogs age, what they have diminished joint and hip health that may lead to pain and reduce a dog’s activity level. This reduction in activity can also lead to other conditions such as weight gain and lethargy. A study is to be conducted to see which of two dietary supplements, glucosamine or chondroitin, is more effective in promoting joint and hip health. Researchers will randomly select 300 dogs from different large veterinary clinics around the county to participate in the study. Changes in joint and hip health will be evaluated after 6 months of treatment.

What are the treatments?

What are the subjects/individuals?

What is the response variable?

What would be the advantage of adding a control group to this study?

Design the experiment below (including your control group)

**Example 4:**

The dentists at a dental clinic would like to determine if there is a difference between the number of new cavities in people who eat an apple a day and in people who eat less than one apple a week. They are going to conduct a study with 50 people in each group.

50 clinic patients who report that they routinely eat an apple a day and 50 clinic patients who report that they eat less than one apple a week will be identified. The dentists will examine the patients and their records to determine the number of new cavities the patients have had over the past two years. They will then compare the number of new cavities in the two groups.

* Why is this an observational study and not an experiment?
* What lurking variables are there in the design of this study?
* Explain the concept of confounding in the context of this study. Use your lurking variables from above to help

**Example 5:**

A researcher wants to conduct a study to test whether listening to soothing music for 20 minutes helps to reduce blood pressure in patients with high blood pressure, compared to simply sitting quietly in a noise-free environment for 20 mins. 100 patients with high blood pressure at a large medical clinic are available for the study. **Design this experiment. Discuss possible sources of bias and lurking variables.**

**Principles of Experimental Design: (p. 265)**

1. **CONTROL**
2. **RANDOMIZATION**
3. **REPLICATION**

**Statistical Significance-**